SECTION 5

QUESTION 4: Is the level of theoretical rigor of the equations used to describe the various processes affecting PCB fate and transport, such as settling, resuspension, volatilization, biological activity, partitioning, etc., adequate, in your professional judgment, to address the principal need for the model (as defined above)? If not, what processes and what resolution are required?

5.1 OMISSION OF EQUATIONS REPRESENTING POTENTIALLY IMPORTANT PROCESSES

In general, the theoretical rigor of the equations presented within the MFD is adequate to describe the various PCB fate processes. However, equations are not presented for some potentially important processes. For example, none of the equations used to describe PCB fate processes within the EFDC modeling framework is presented. Hence, it is not possible to evaluate the theoretical rigor of these equations. The MFD describes plans to simulate PCB fate using two independent modeling frameworks (EFDC and AQUATOX). Hence, it is important that the two models represent important processes, such as chemical partitioning, sediment-water exchange, and surface sediment mixing, in a consistent manner. Without such consistency, it may be difficult or even impossible to maintain PCB continuity. For example, fluxes to and from the floodplain will be calculated by EFDC using water column particulate and dissolved-phase PCB concentrations calculated by EFDC. These fluxes will then be transferred to AQUATOX as part of the main channel PCB fate calculations. If the two models do not consistently represent PCB partitioning -- that is, if they do not calculate the same particulate and dissolved phased water column PCB concentrations -- then PCB mass balance issues will arise.

The conceptual model presents sediment bed load as an important sediment and, potentially, PCB transport process in the River. However, neither the MFD nor the QAPP presents a description of the sediment bed load transport equations in EFDC, the method for calibration, or how the results of these calculations will be transferred to AQUATOX. The

simulation of sediment bed load and its integration into the PCB fate model construct is a potentially complex process that should be discussed in the MFD.

Finally, as noted above, the MFD suggests that oil may be present within the upper reaches of the study area. However, there is no discussion as to how PCB dissolution from an oil phase and oil transport will be represented in the models. If an oil phase is important, then the equations describing its dynamics should be included in the MFD.

5.2 LACK OF SUPPORT FOR EQUATIONS USED IN AQUATOX TO CONVERT WATERSHED LOADS OF BOD AND TOC TO POM AND DOM LOADING

An important linkage between HSPF and AQUATOX involves the transfer of information on watershed loadings of particulate organic matter (POM) and dissolved organic matter (DOM). HSPF does not directly predict POM and DOM loads from the watershed. Instead, HSPF simulates biological oxygen demand (BOD) and total organic carbon (TOC) transport and outputs BOD and TOC loads for use in AQUATOX. The MFD describes the conversion of BOD and TOC loads to POM and DOM loads by using various empirical ratios (MFD page 4-60). This approach may be problematic for several reasons. First, the MFD does not provide a detailed discussion of the methodology that will be used to establish the conversion factors. Second, accurately converting TOC to POM may be difficult due to inherent difficulties in measuring POM. Finally, as noted earlier, mass continuity problems may be encountered for organic and non-organic solids when attempting to link HSPF, EFDC, and AQUATOX.